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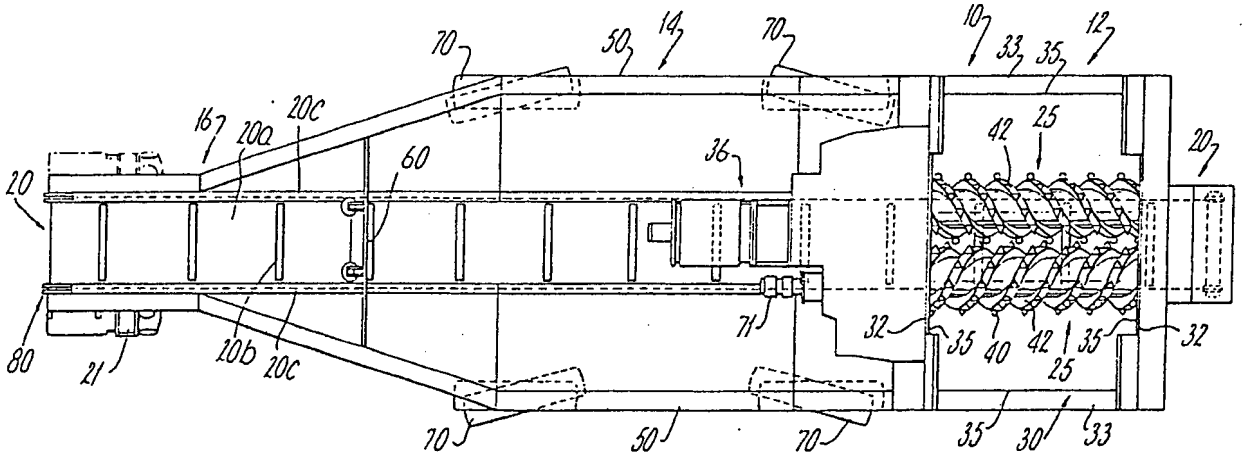

(57) Abstract

A breaker-feed apparatus including a mineral inlet compartment having a mineral sizer which breaks mineral to a desired size, feed means for feeding the broken material into a storage compartment, the storage compartment including conveyor means for moving the broken material from the storage compartment to a discharge station.

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MINERAL BREAKER-FEED APPARATUS

The present invention relates to a mineral breaker-feed apparatus.

A breaker-feed apparatus is usually sited near to the location whereat the mineral is won and is used for receiving the freshly won mineral and delivering it to a conveying system which conveys the mineral away to a desired location. The breaker-feed apparatus usually attempts to provide two basic functions, viz. (a) break down oversized pieces of mineral which could otherwise cause blockage problems in the conveying system and (b) provide a regularised flow of mineral into the conveying system, thereby isolating the conveying system from surges or intermittent deposits of mineral.

Heretofore, a breaker-feed apparatus has usually included a storage or hopper compartment into which the freshly won mineral is deposited and a conveyor which moves the mineral out of the storage compartment to a discharge location whereat it is deposited onto a take-away conveyor which forms part of the conveying system.

A breaker drum is usually sited above the conveyor at a suitable position upstream from the discharge location so that oversized mineral being conveyed by the conveyor is subjected to a breaking operation.

There are some disadvantages with this type of breaker-feed apparatus in that certain shapes of oversized mineral still remain unbroken by the breaker drum and so still cause blockage problems either within the apparatus itself or in the conveying system, e.g. large flat pieces of mineral may pass beneath the breaker drum without being broken. Additionally regularising the flow of mineral from the storage compartment is difficult and unsatisfactory due to the large variation in sizes of pieces of mineral contained therein.

It is a general aim of the present invention to provide

a breaker-feed apparatus which eliminates or substantially reduces these problems.

According to the present invention there is provided a breaker-feed apparatus including a mineral inlet compartment having a mineral sizer which breaks mineral to a desired size, feed means for feeding the broken material into a storage compartment, the storage compartment including conveyor means for moving the broken material from the storage compartment to a discharge station.

Various aspects of the present invention are hereinafter described with reference to the accompanying drawings, in which:

Figure 1 is a side view of an embodiment according to the present invention;

Figure 2 is a plan view of the embodiment shown in Figure 1;

Figure 3 is a sectional view taken along line A-A in Figure 1;

Figure 4 is a sectional view taken along line C-C in Figure 1;

Figure 5 is a sectional view taken along line B-B in Figure 1.

Figure 6 is a side view of another embodiment according to the present invention;

Figure 7 is a plan view of the embodiment shown in Figure 6.

Figure 8 is an illustration of a screw conveyor.

Apparatus according to the present invention is generally shown at 10 and includes three distinct sections, a mineral inlet section or compartment 12, a mineral storage section or compartment 14 and a mineral discharge section or station 16; the three sections being located in succession and joined together to make a single composite unit. A conveyor 20 powered by a hydraulic motor 21 is provided which passes in succession through sections 12, 14 and 16, the upper run 20a of the conveyor defining the base of each section. The direction of movement of the upper run of the

conveyor is from right to left as viewed in Figure 1 so that mineral may be conveyed thereby in succession through sections 12, 14 and 16. The conveyor illustrated has individual flights 20b interconnected by chains 20c and provides a positive feed conveyor. It will be appreciated that other types of feed conveyor may be provided if desired.

In the mineral inlet section 12 there is provided a pair of mineral breaker drums 25 which are positioned above the conveyor 20. In the inlet section 12 the upper run of the conveyor forms the base of the section and the drums are mounted so that their axes of rotation are substantially parallel to the path of travel of the conveyor.

The breaker drums 25 are rotatably mounted in a housing 30 which has end walls 32 and inclined side walls 33. The side walls 33 are made up of panels 34 fabricated from steel plating and which are bolted together. The inner surface of end walls 32 and side walls 33 are defined by wear plates 35.

The breaker drums 25 are rotated by a drive unit 36, the drive unit serving to rotate the breaker drums in opposite directions so that material deposited into the inlet section is directed between the drums and broken by the picks 40 mounted on each drum.

Each drum 25 is provided with helical scrolls 42 and the picks 40 are mounted on the scrolls so that on rotation of the drums picks on one drum intermesh with picks on the other drum.

The scrolls are designed so as to quickly move mineral which has passed between the drums into the mineral storage section 14. Accordingly mineral which has been broken by the drums is moved at a faster rate into the storage section 14 than the rate of travel of the conveyor 20.

This has two main advantages; firstly it enables mineral to be deposited into the inlet section 12 at a faster rate than the conveyor 20 is capable of handling, for instance large volumes of mineral may be intermittently deposited, and secondly it permits the conveyor 20 to run at a rate of feed which is independent of the rate of deposits into the inlet

section and at a rate which can be matched to that of the take-off conveyor (not shown) which is to be fed by the present apparatus.

In order to permit the drums to move broken mineral quickly into the storage section 14 an opening 48 is provided which is of sufficient dimensions to enable the desired throughput to be handled.

It is envisaged that the conveyor 20 need not extend into the inlet section or may only extend partially into it since it is possible to rely solely on the breaker drums for moving material into the storage section, or other feed means.

The storage section 14 includes inclined side walls 50 which form a continuation from side walls 33 and which are composed of separate panels 52 which are fabricated from steel plate and bolted together. Accordingly, the length of the storage section 14 (and hence its holding capacity) can be easily varied by insertion or removal of a desired number of panels 52. The inside surface of walls 50 are defined by wear plates 53.

Accordingly broken mineral entering the storage section 14 is moved along its length by the conveyor toward the discharge section 16. The incline on the side walls 50 serves to ensure that mineral located within the storage section 14 is also directed onto the conveyor.

As seen in Figure 1, the conveyor 20 extends into the discharge section 16 and terminates at a sprocket assembly 80. The sprocket assembly 80 is driven by the hydraulic motor 21 and in turn drives the conveyor 20. The upper run 20a of the conveyor forms the base of the discharge section and it is arranged to form an inclined base so that the terminal end of the conveyor may be positioned above a take away conveyor so that material passing through the discharge section is moved up the incline to be deposited onto the take away conveyor. The steepness of the incline of the base of the discharge section may be selected in order to create a "boiling effect" in the material being conveyed up the

incline (i.e. some of the material falls back down the incline) so as to help regulation of discharge of material from the discharge section.

The storage section 14 is partitioned from the discharge section 16 by a movable partition 60 which can be raised or lowered as desired. The movable partition 60 therefore serves as a means of control of mineral being discharged from the storage section 14. Thus the partition can be used to prevent flow of mineral out of the storage section 14 in which case if mineral is still being deposited in the inlet section 12 mineral would build up behind the partition and would continue to build up progressively toward the entrance to the storage section 14.

As indicated above feed means for moving the broken mineral into the storage compartment may comprise the breaker drums alone or a combination of the breaker drums and the conveyor 20. As an alternative it is envisaged that the feed means may include a screw conveyor which is located beneath the breaker drums and arranged to feed the broken mineral through said opening 48. The use of such a conveyor enables other types of breaker drums to be used. By way of example, reference is made to our published PCT Patent Application WO 83/00318 which illustrates a screw conveyor posiitioned beneath breaker drums. For the purposes of illustration only Figure 1 of PCT Patent Application WO 83/00318 is reproduced herein as Figure 8.

Preferably, the apparatus is provided with means for moving the apparatus over ground. In this respect the illustrated embodiment is provided with wheels 70 which are preferably driven by a hydraulic motor 71 and are steerable. The apparatus is therefore self propelled and steerable. As shown the wheels 70 are mounted on the storage section. In order to distribute weight loadings, the inlet section preferably includes support means which as illustrated is in the form of a base portion 12a which is arranged to contact the ground. Accordingly, the weight of material being deposited into the inlet section is distributed between the

portion 12a and wheels 70. It is envisaged that the support means may be in the form of retractable support members so that during movement of the unit the support means may be retracted.

It will be appreciated that other forms of motivation may be provided, for instance the wheels may be replaced by continuous tracks or for example hydraulic powered skids as disclosed in our published U.K. Patent Application 8129149 (publication No: 2106464).

An alternative embodiment is illustrated in Figures 6 and 7. The embodiment shown in Figures 6 and 7 has many similarities to the embodiment described with reference to Figures 1 to 5 and accordingly similiar parts have been designated by similar reference numerals.

As shown in Figure 7 the breaker drums 25 are mounted in the inlet section 12 so that their axes of rotation are inclined to the direction of travel of the upper run 20a of conveyor 20. As shown the inclination of the drums is such that they are spaced further above the upper runs 20a at the discharge end of the inlet section 12. This is desirable as it enables a greater height of material to be discharged from the inlet section and into the storage section 14.

The side walls 33 extend rearwardly of the breaker drums to terminate approximately directly above the rearmost end of the casing 101 housing the rearmost sprocket assembly 100 of the conveyor 20. The uppermost edge 33a of each side wall is conveniently inclined so as to be parallel with the inclined axes of the drums and is preferably arranged so as to be level with the uppermost path of travel of the picks protruding from the drums. Advantageously removable side walls 110 are provided which serve to define a hopper for feeding material to the breaker drums 25.

Conveniently, the motor 36 for driving the drums is located so as to extend along the outside of one of the side walls and drives the drums through a gear box 36a.

As indicated previously and as specifically shown in Figures 6 and 7 continuous tracks 120 are provided for moving

the entire unit over ground. The motive power unit 121 for driving the pair of continuous tracks 120 is conveniently mounted to extend along the outside and beneath the opposite side wall 33 under which motor 36 is mounted.

CLAIMS

1. A breaker-feed apparatus including a mineral inlet compartment having a mineral sizer which breaks mineral to a desired size, feed means for feeding the broken material into a storage compartment, the storage compartment including conveyor means for moving the broken material from the storage compartment to a discharge station.

2. An apparatus according to Claim 1 wherein the inlet compartment communicates with the storage compartment via an opening, the mineral breaker being housed within the inlet compartment so as to be be above the opening.

3. An apparatus according to Claim 1 or 2 wherein the mineral breaker includes a pair of rotatable breaker drums having helical formations thereon for moving broken material into the storage compartment.

4. An apparatus according to Claim 1, 2 or 3 wherein the conveyor means extends into the inlet compartment so that mineral broken by the mineral breaker is deposited thereon.

5. An apparatus according to Claim 3 or 4 wherein the breaker drums are rotatably housed in the inlet compartment so that their axes of rotation are substantially parallel to the path of travel of said conveyor means.

6. An apparatus according to Claim 3 or 4 wherein the breaker drums are rotatably housed in the inlet compartment so that their axes of rotation are inclined to the path of travel of said conveyor means so that there is greater clearance between the breaker drums and the base of the inlet compartment at the discharge end of said inlet compartment.

7. An apparatus according to Claim 1 or 2 wherein the feed means includes a screw conveyor located below the mineral

breaker.

8. An apparatus according to any preceding Claim wherein the discharge station includes an inclined base along which the conveyor means conveys material.

9. An apparatus according to any preceding Claim wherein a movable partition is provided between the storage compartment and the discharge station for regulating the flow of material therebetween.

10. An apparatus according to any preceding Claim wherein the inlet compartment, storage compartment and discharge station are located in succession along the conveyor means and are connected together to form a single composite unit.

11. An apparatus according to Claim 10 wherein said unit is provided with motive means for moving the unit across a surface.

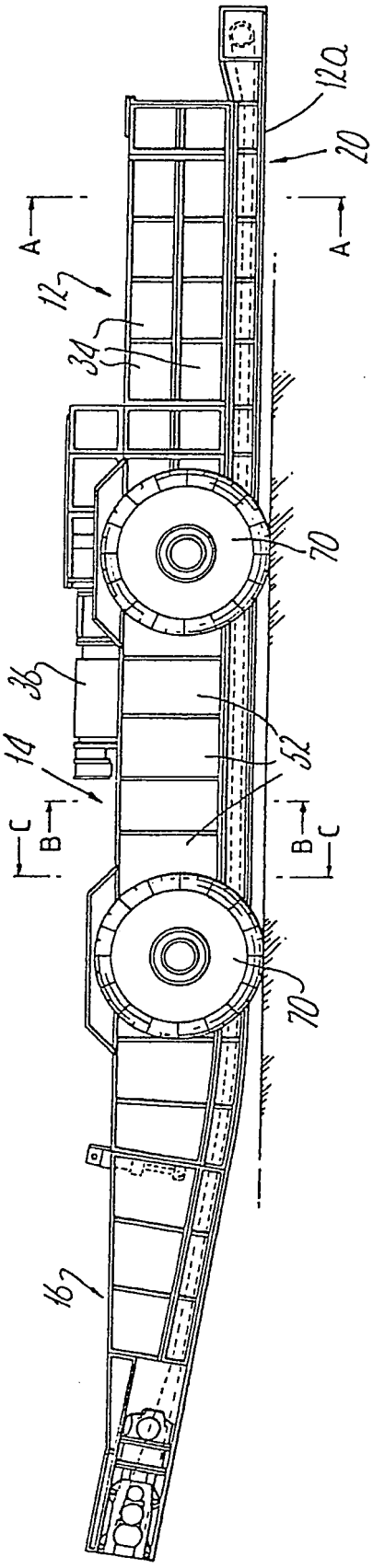
12. An apparatus according to Claim 11 wherein the motive means comprises wheels.

13. An apparatus according to Claim 11 wherein the motive means comprises a pair of endless tracks located on either side of the unit.

14. An apparatus according to Claim 12 or 13 wherein the motive means are mounted on the storage section.

15. An apparatus according to Claim 14 wherein the inlet compartment includes support means which is arranged to contact said surface.

16. A breaker-feeder substantially as described with reference to and as illustrated in any of the accompanying drawings.


12a
20
A
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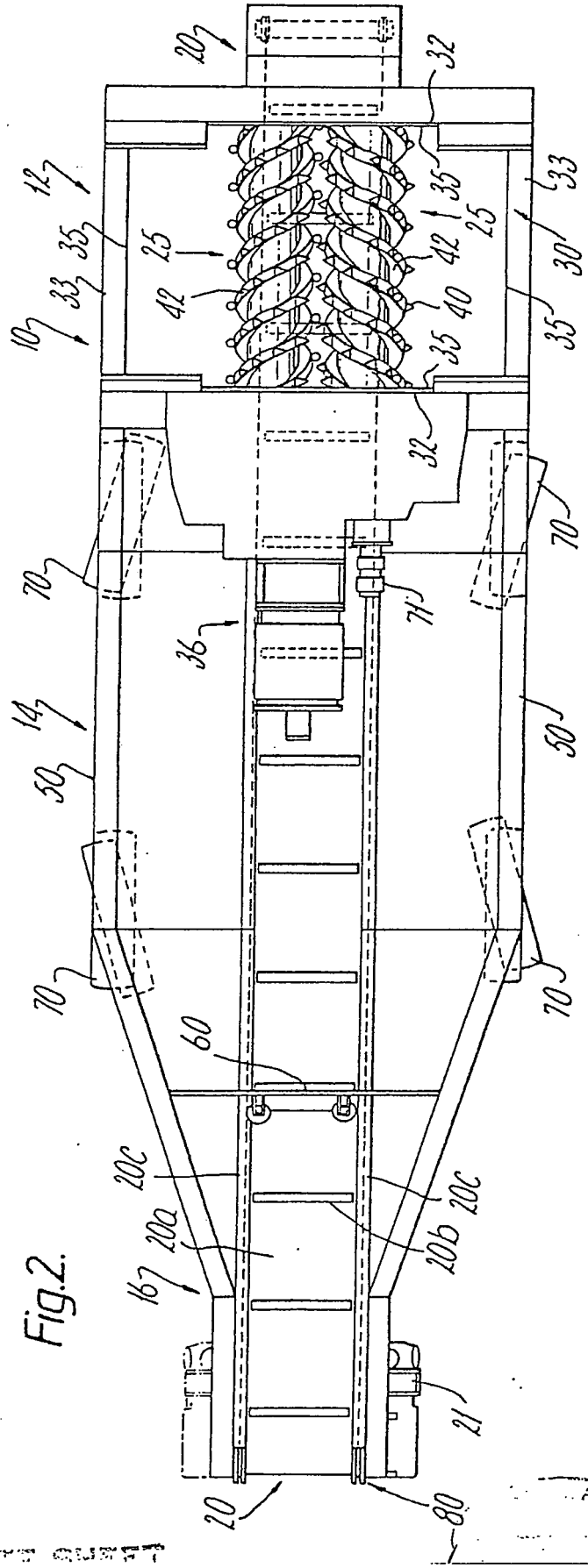
70
16

Fig.1.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80

Fig.2.

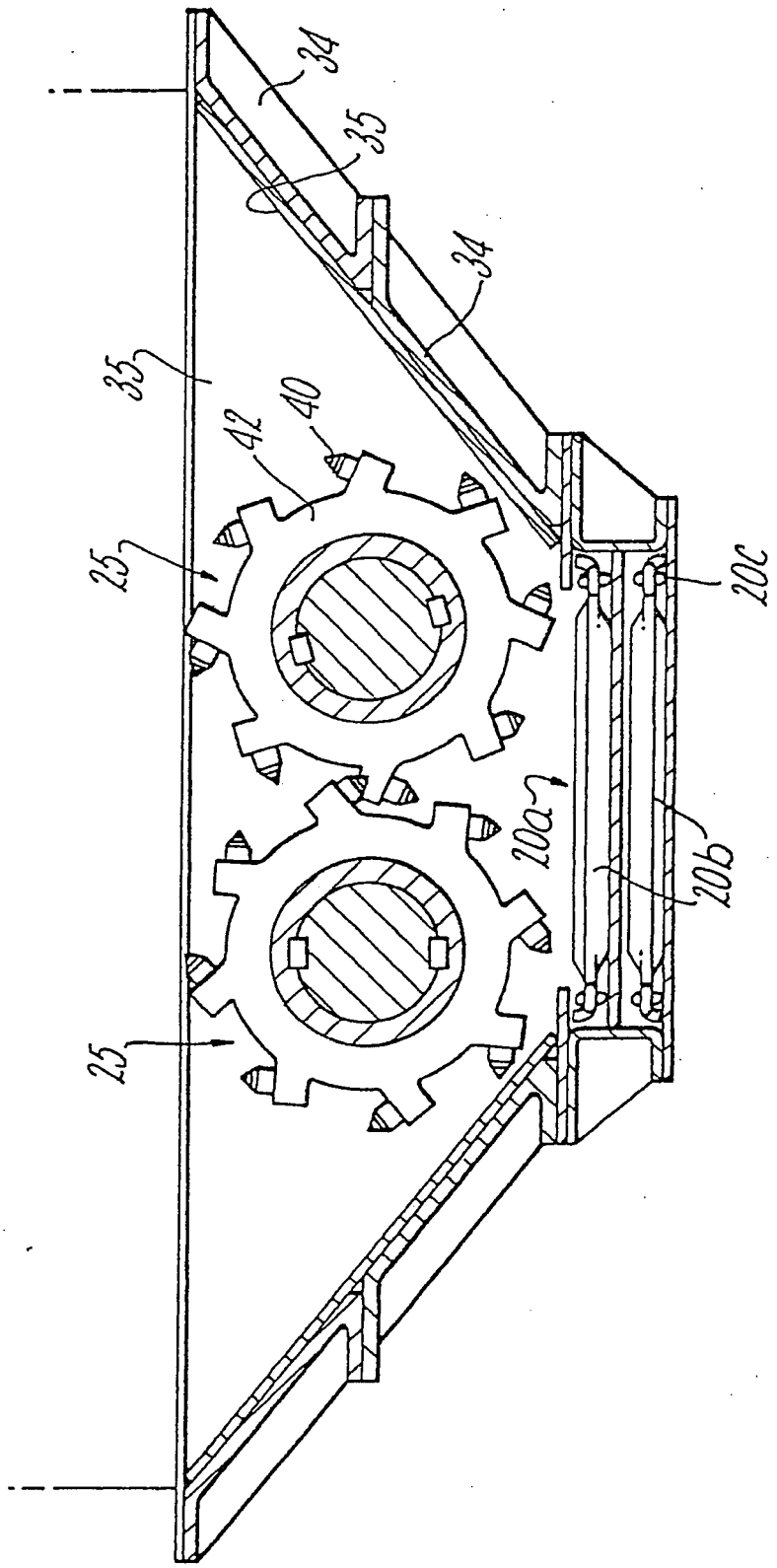


Fig.3.

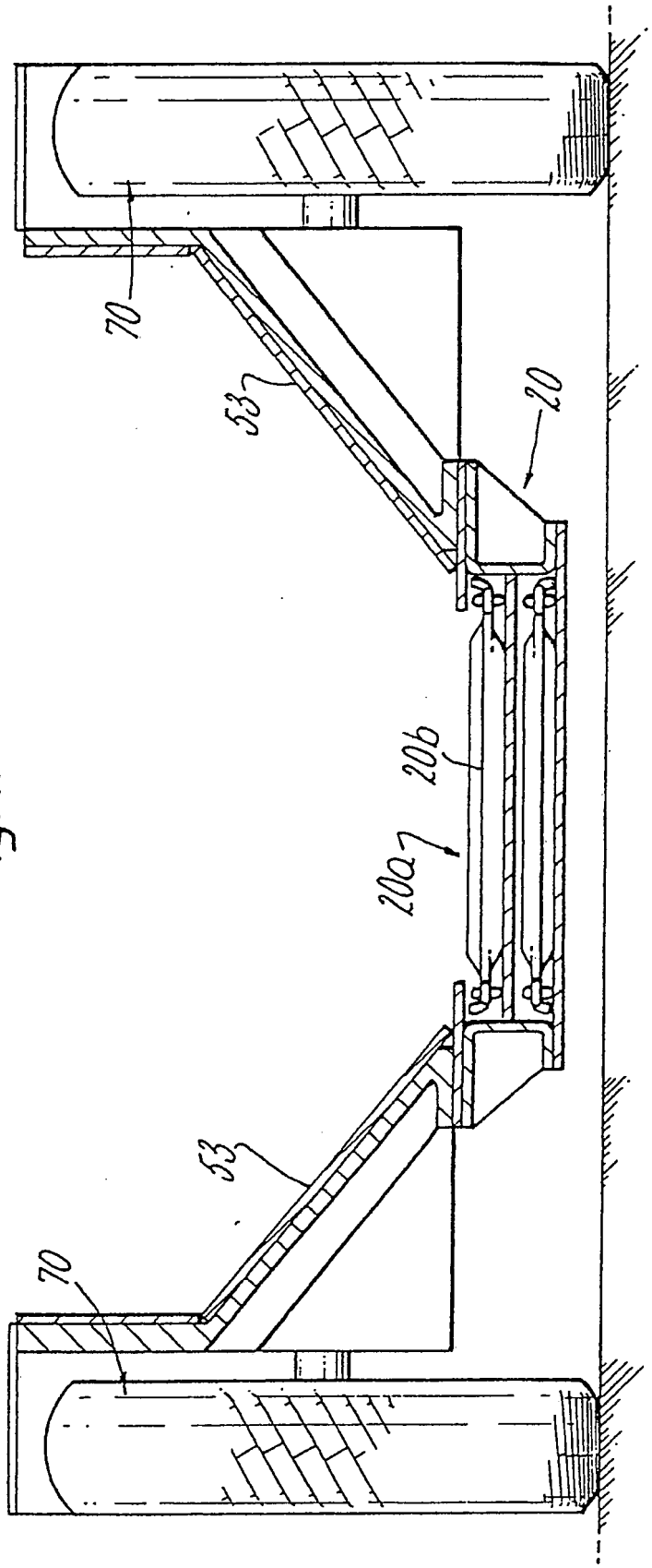


Fig.4.

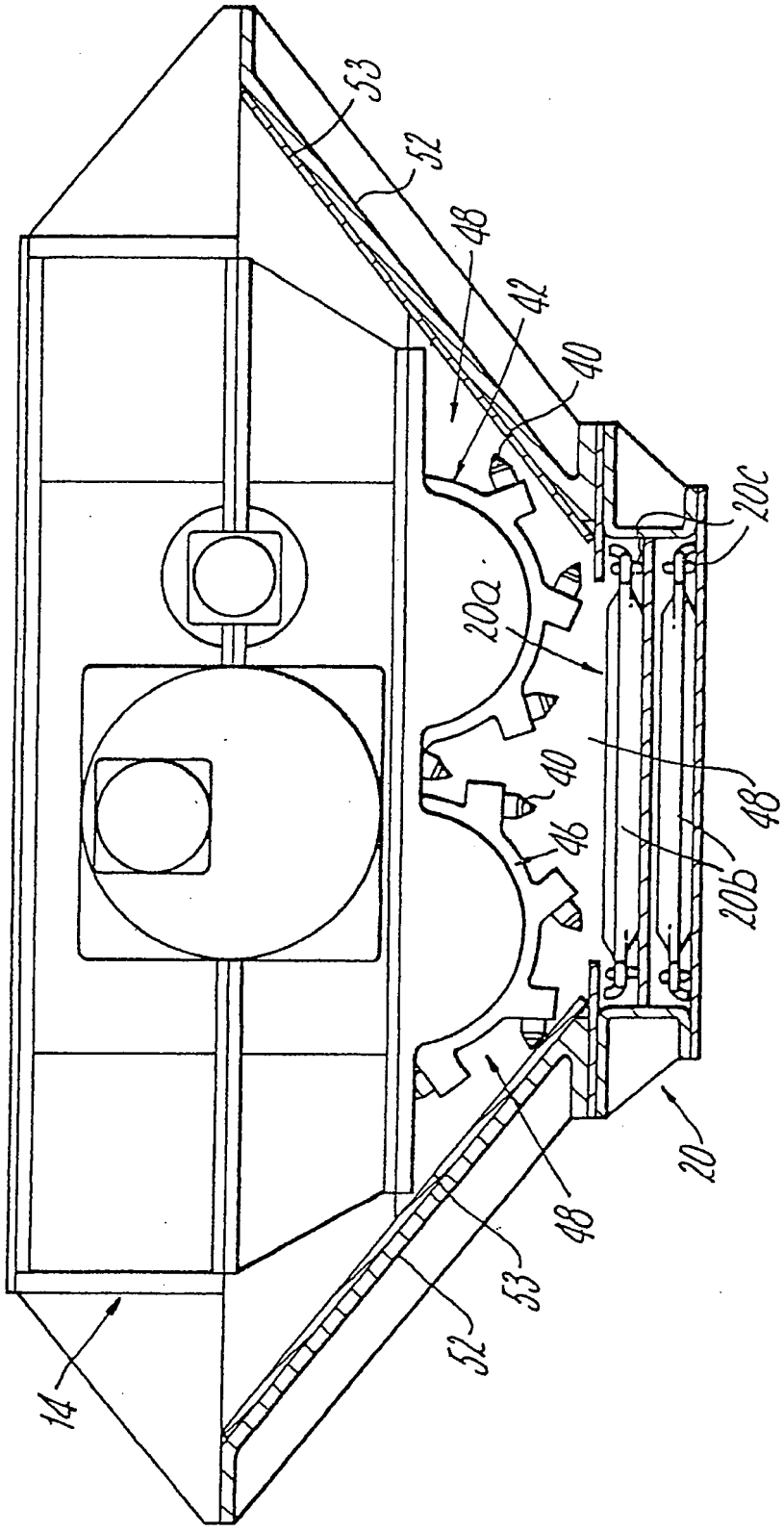


Fig.5.

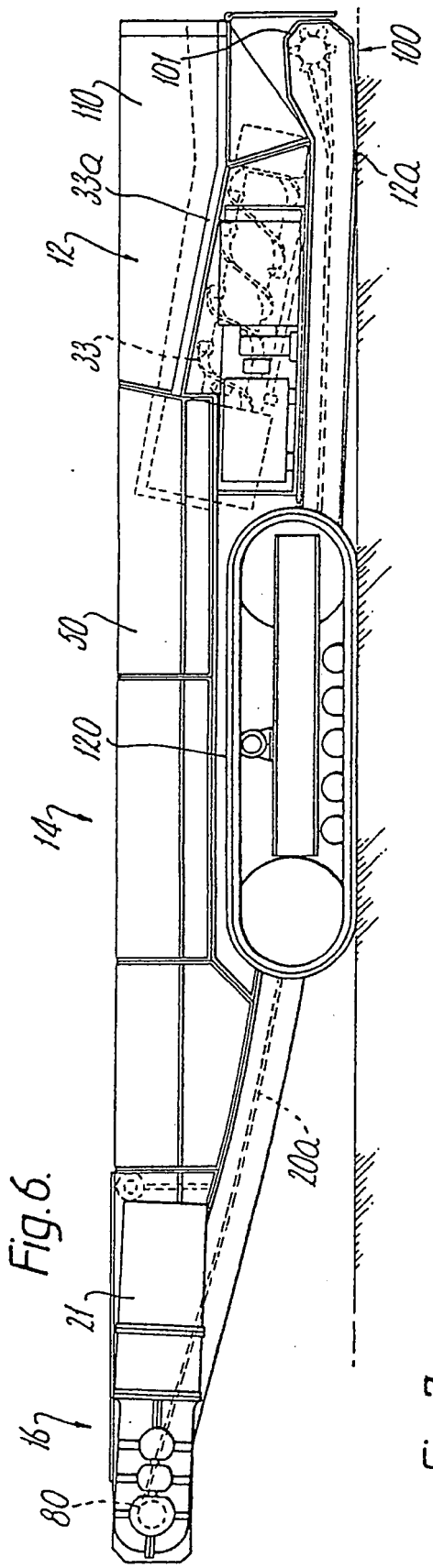


Fig.6.

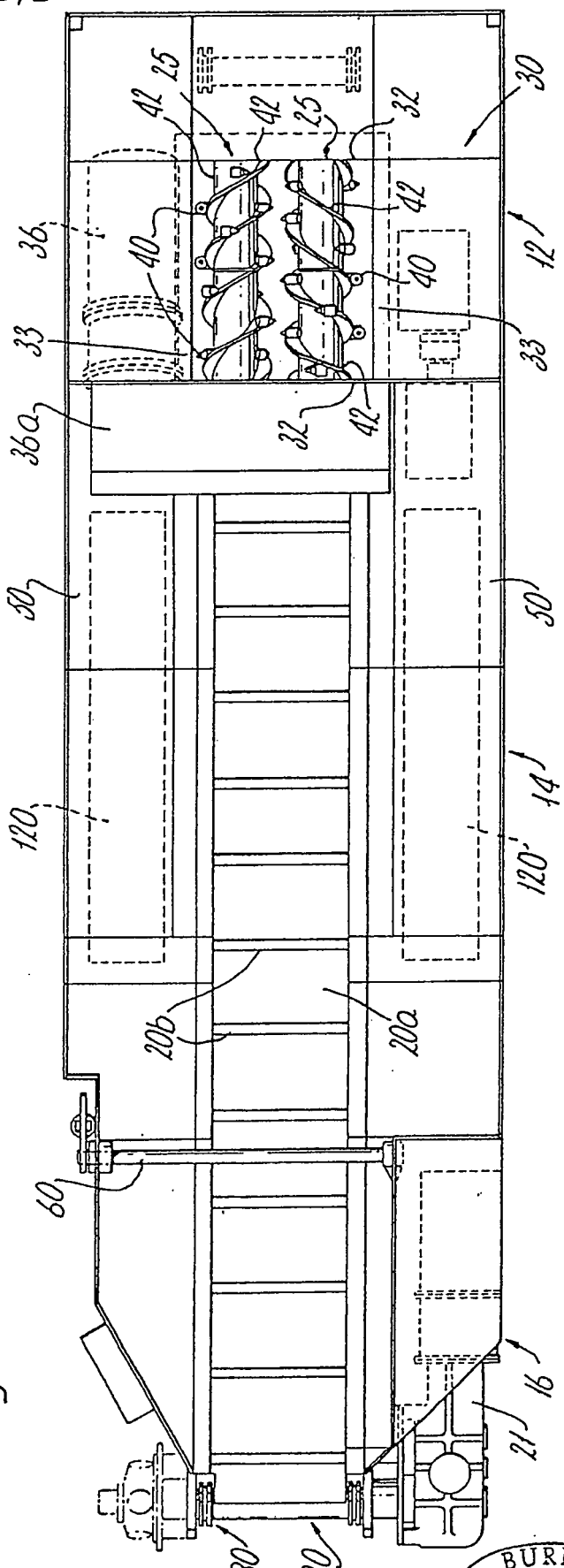
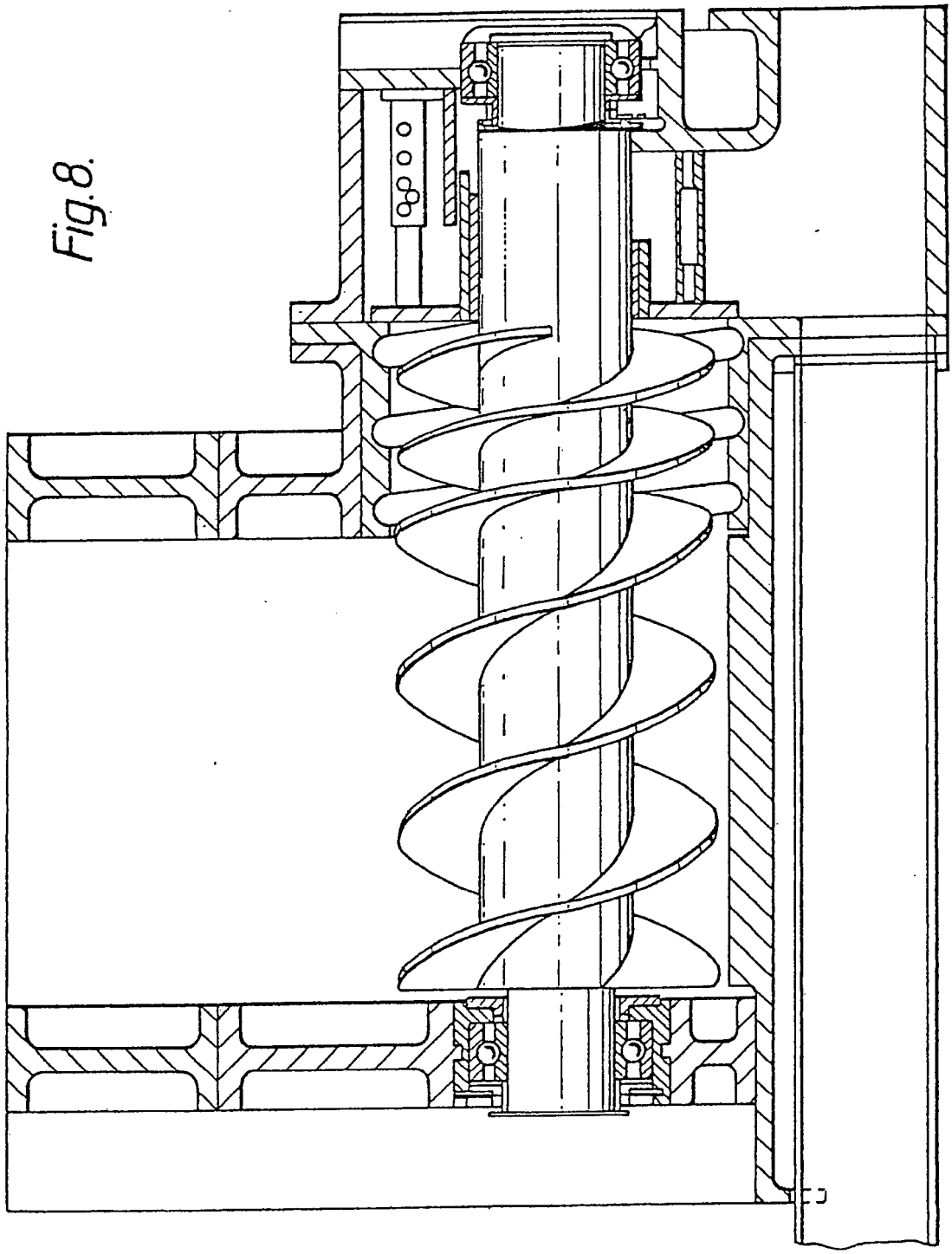


Fig.7.

Fig.8.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 83/00101

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[3]: E 21 F 13/02; B 02 C 4/08

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC[3]	E 21 F; B 02 C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
A	FR, A, 1373307 (BEIEN) 17 August 1964 see page 1, lines 42-62; figures 1-4	1,3-5,11,12
A	GB, A, 1601048 (WESTFALIA) 21 October 1981 see figures 1-3	1,4,8,10-12
A	FR, A, 2314855 (FIVES-CAIL BABCOCK) 14 January 1977 see page 2, lines 28-32; figure 1	1,4,10-12
A	FR, A, 2067549 (FIVES LILLE CAIL) 20 August 1971	
A	GB, A, 1476867 (CONTINENTAL OIL) 16 June 1977	

* Special categories of cited documents: [15]

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
13th July 1983	29 JUL 1983
International Searching Authority [1]	**Signature of Authorized Officer [20]**
EUROPEAN PATENT OFFICE	G.L.M. Kruydenberg

Form PCT/ISA/210 (second sheet) (October 1981)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 83/00101 (SA 5030)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 26/07/83

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
FR-A- 1373307		None		
GB-A- 1601048	21/10/81	FR-A,B	2397233	09/02/79
		DE-A-	2731424	25/01/79
FR-A- 2314855	14/01/77	None		
FR-A- 2067549	20/08/71	None		
GB-A- 1476867	16/06/77	FR-A,B	2267832	14/11/75
		DE-A-	2509610	13/11/75
		US-A-	B462828	09/03/76
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		AU-B-	469868	26/02/76
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